WHAT IS CLAIMED IS:

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1. An image capture system for generating an extended effective dynamic range from a signal provided by an image sensor, said image capture system comprising:

an image sensing device having standard photosites with a predetermined response to a light exposure and non-standard photosites with a slower response to the same light exposure;

an optical section for exposing the image sensing device to image light, thereby causing the image sensing device to generate an image signal; and

a processing section for expanding the response of the standard photosites to increased light exposures by utilizing the image signals from neighboring non-standard photosites.

2. The image capture system as claimed in claim 1 wherein the processing section expands the response of the non-standard photosites to decreased light exposures by utilizing the image signals from neighboring standard photosites.

3. The image capture system as claimed in claim 2 wherein the processing section further comprises:

means for processing the image signals against a plurality of thresholds, including a high exposure response threshold for the standard photosites and a low exposure response threshold for the non-standard photosites;

means for replacing the image signals from standard photosites exceeding the high exposure response threshold with a combination of the image signals from a neighborhood of non-standard photosites; and

means for replacing the image signals from non-standard photosites less than the low exposure response threshold with a combination of the image

signals from a neighborhood of standard photosites, thereby producing an output image signal with an extended effective dynamic range.

4. The image capture system as claimed in claim 1 wherein the image sensing device and the optical section are part of a digital camera and the processing section is part of a host computer separate from the digital camera.

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5. The image capture system as claimed in claim 4 wherein the processor is accessible via a network

6. The image capture system as claimed in claim 1 wherein the image sensing device, the optical section and the processing section are included in a digital camera.

7. The image capture system as claimed in claim 1 wherein the non-standard photosites have a response that is slower by at least one stop compared to the standard photosites.

8. The image capture system as claimed in claim 1 wherein the photosites are monochromatic photosites.

9. The image capture system as claimed in claim 1 wherein the photosites are color photosites and the neighboring non-standard photosites are of the same color as standard photosite being processed by the processing section.

10. An image capture system for generating an extended effective dynamic range from a signal provided by an image sensor, said image capture system comprising:

an image sensing device having standard photosites with a predetermined response to a light exposure and non-standard photosites with a slower response to the same light exposure;

an optical section for exposing the image sensing device to image light, thereby causing the image sensing device to generate an image signal; and

a processing section for expanding the response of the non-standard photosites to decreased light exposures by utilizing the image signals from neighboring standard photosites.

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11. The image capture system as claimed in claim 10 wherein the processing section expands the response of the standard photosites to increased light exposures by utilizing the image signals from neighboring non-standard photosites.

12. An image capture system providing an extended effective dynamic range, said system comprising:

an image sensing device having standard photosites with a predetermined standard response to a light exposure and non-standard photosites with a slower response to the same light exposure;

an optical section for exposing the image sensing device to image light, thereby causing the image sensing device to generate an image signal;

means for converting the image signal into digital image signals corresponding to the output of the standard and non-standard photosites; and

a processor that (a) processes the digital image signals against a plurality of thresholds, including a high exposure response threshold for the standard photosites and a low exposure response threshold for the non-standard photosites, (b) replaces the digital image signals from standard photosites exceeding the high exposure response threshold with a combination of the digital image signals from a neighborhood of non-standard photosites and (c) replaces the digital image signals from non-standard photosites less than the low exposure

response threshold with a combination of the digital image signals from a neighborhood of standard photosites, thereby producing an output digital image signal with an extended effective dynamic range.

A1 Cont

13. The image capture system as claimed in claim 12 wherein the non-standard photosites have a response that is slower by at least one stop compared to the standard photosites.

14. The image capture system as claimed in claim 12 wherein the photosites are monochromatic photosites.

15. The image capture system as claimed in claim 12 wherein the photosites are color photosites.

16. The image capture system as claimed in claim 15 wherein the color photosites are arranged in a color filter array pattern.

17. The image capture system as claimed in claim 16 wherein each photosite is sensitive to one of a plurality of colors and the processor interpolates the other colors for each photosite from the neighboring photosites.

18. The image capture system as claimed in claim 12 wherein the image sensing device, the optical section and the converting means are part of a digital camera and the processor is part of a host computer separate from the digital camera.

19. The image capture system as claimed in claim 18 wherein the processor is accessible via a network.

20. The image capture system as claimed in claim 12 wherein the image sensing device, the optical section, the converting means and the processor are included in a digital camera.

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21. An image capture device providing an extended effective dynamic range, said image capture device comprising:

an image sensing device having standard photosites with a predetermined standard response to a light exposure and non-standard photosites with a slower response to the same light exposure;

an optical section for exposing the image sensing device to image light, thereby causing the image sensing device to generate an image signal;

means for converting the image signal into digital image signals corresponding to the output of the standard and non-standard photosites; and

a processor that expands the response of the standard photosites to increased exposures by utilizing the digital image signals from neighboring non-standard photosites and expands the response of the non-standard photosites to decreased exposures by utilizing the digital image signals from neighboring standard photosites.

22. The device as claimed in claim 21 wherein the processor (a) processes the digital image signals against a plurality of thresholds, including a high exposure response threshold for the standard photosites and a low exposure response threshold for the non-standard photosites, (b) replaces the digital image signals from standard photosites exceeding the high exposure response threshold with a combination of the digital image signals from a neighborhood of non-standard photosites and (c) replaces the digital image signals from non-standard photosites less than the low exposure response threshold with a combination of the digital image signals from a neighborhood of standard photosites, thereby producing an output digital image signal with an extended effective dynamic range.

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23. A method for generating an extended effective dynamic range from a signal provided by an image sensor, said method comprising the steps of:

generating image signals from an image sensing device having standard photosites with a predetermined standard response to a light exposure and non-standard photosites with a slower response to the same light exposure; and

expanding the dynamic range of selected photosites to extreme exposures by utilizing the image signals from neighboring photosites having a response, either standard or non-standard, opposite to that of the selected photosites.

24. The method as claimed in claim 23 wherein the step of expanding the dynamic range comprises expanding the response of the standard photosites to increased exposures by utilizing the image signals from neighboring non-standard photosites and expanding the response of the non-standard photosites to decreased exposures by utilizing the image signals from neighboring standard photosites.

25. The method as claimed in claim 24 wherein the step of expanding the respective response of the standard and non-standard photosites comprises the steps of:

processing the image signals against a plurality of thresholds, including a high exposure response threshold for the standard photosites and a low exposure response threshold for the non-standard photosites;

replacing the image signals from standard photosites exceeding the high exposure response threshold with a combination of the image signals from a neighborhood of non-standard photosites; and

replacing the image signals from non-standard photosites less than the low exposure response threshold with a combination of the image signals from a neighborhood of standard photosites, thereby producing an output image signal with an extended effective dynamic range.

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26. An image sensor for generating an image signal with a differential response to image light, said image sensor comprising:

an array of photosites divided into standard photosites and non-standard photosites; and

a structural element overlying the photosites and providing the standard photosites with a predetermined standard response to a light exposure and the non-standard photosites with a slower response to the same light exposure.

27. The image sensor as claimed in claim 26 wherein the structural element comprises an array of lenslets overlying the photosites, wherein the lenslets overlying the standard photosites are structured to be more efficient in focusing light than the lenslets overlying the non-standard photosites.

28. The image sensor as claimed in claim 26 wherein the structural element comprises a mask with apertures overlying the photosites, wherein the apertures overlying the standard photosites are larger than the apertures overlying the non-standard photosites.

29. The image sensor as claimed in claim 26 wherein the structural element comprises a neutral density filter overlying the photosites, wherein the portion of the neutral density filter overlying the standard photosites is more transparent than the portion of the neutral density filter overlying the non-standard photosites.

30. An algorithm utilizing the image sensor as claimed in claim 26 in order to expand the response of the standard photosites to increased exposures by utilizing the image signals from neighboring non-standard photosites and to expand the response of the non-standard photosites to decreased exposures by utilizing the image signals from neighboring standard photosites.

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31. The image sensor as claimed in claim 26 further including a color filter array comprised of two or more colors overlying the photosites, said standard and non-standard photosites being associated with each color of the array.

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32. The image sensor as claimed in claim 31 wherein the color filter array is a Bayer array.

33. An algorithm utilizing the image sensor as claimed in claim 31 in order to expand the response of the standard photosites of each color to increased exposures by utilizing the image signals from neighboring non-standard photosites of the same color at least two lines removed from the corresponding standard photosite and to expand the response of the non-standard photosites of each color to decreased exposures by utilizing the image signals from neighboring standard photosites of the same color at least two lines removed from the corresponding non-standard photosite.

34. A digital camera including the image sensor claimed in claim 26.

35. The image sensor as claimed in claim 26 wherein the structural element comprises an array of lenslets overlying the standard photosites, and the non-standard photosites are not overlayed with lenslets.

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